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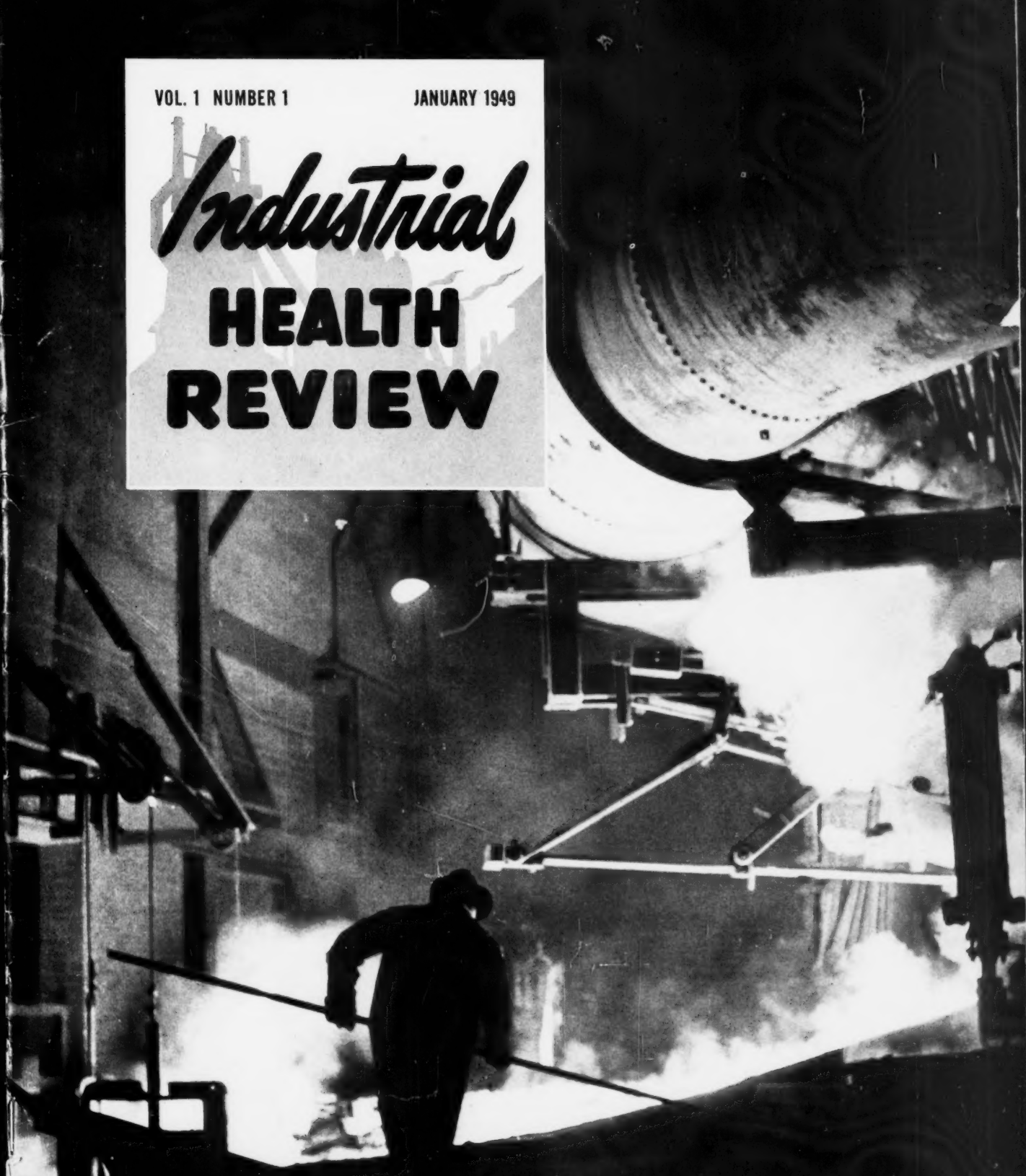
Industrial HEALTH REVIEW



Industrial Health Division
Department of National Health and Welfare

FOREWORD

THE *Industrial Health Review* is being published by our Division of Industrial Health to meet a need for wider circulation of technical information on industrial medicine and hygiene in Canada. In addition, it will provide a medium for the regular interchange of information among the growing number of professional workers in this field. It is hoped that the *Review* will keep personnel informed of activities in other areas, will help to prevent duplication of effort and will stimulate and sustain interest.

The contents will deal in a general way with such topics as: current industrial health activities in Canada and abroad; research projects in industrial health; new toxic materials used in industry; unusual uses of old materials; information on morbidity, mortality and health services in industry; notification of refresher and advanced courses in industrial medicine and hygiene; abstracts of articles which have had a limited circulation, and other material of interest and value to the readers.

The *Review* will be distributed to physicians, industrial nurses, public health organizations, industrial chemists and engineers and others interested in the maintenance of a high standard of health among our working population. The initial circulation will be about 7,000 copies and subsequent issues will be published every six months — during May and November.

Many groups and organizations have enthusiastically endorsed the project and have signified their willingness to send in contributions. Individual workers in the field are also invited to contribute to the publication.

I hope this new medium for the exchange of information and ideas will be of considerable benefit to industrial health workers and I would welcome comments and suggestions for its modification or improvement.

Paul Martin

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A FIELD INSTRUMENT for the determination of low concentrations of *Methyl Bromide* and other Halogenated Hydrocarbons

The Industrial Health Division of the Department of National Health and Welfare announces that Dr. K. Kay, Dr. P. E. Braid and T. H. Doherty of the laboratory staff have developed a simple field instrument for the rapid determination of halogenated hydrocarbons. The reliability of the instrument in measuring low concentrations of methyl bromide (10–200 parts per million) has been demonstrated in laboratory and field trials. The determination is accurate to + 15% or 5 ppm of methyl bromide in the atmosphere, whichever is greater. Research is now in progress to modify the instrument for measuring carbon tetrachloride and trichlorethylene in the same range of concentrations.

The new method will have distinct advantages over those in current use such as the halide lamp and chemical analysis. The halide lamp which was designed to detect leakage of methyl bromide in refrigeration systems cannot accurately determine concentrations below 100 ppm. Since 20 ppm has been generally accepted as the maximum allowable concentration of methyl bromide in the breathing air, the halide lamp is unsuitable as an industrial hygiene control instrument. The chemical method, while accurate, is relatively complicated and time-consuming. Since air samples must be taken in the suspected area and then analyzed in the laboratory by a chemist, results are not available before 24 to 48 hours. The instrument designed by the industrial health laboratory does not have these limitations. It can be operated by any trained person and gives accurate on-the-spot readings in the range of concentrations required for industrial hygiene control.

The diagram shows the side elevation of the apparatus. The air being tested is drawn through the reaction tube by means of the aspirating rubber bulb. The reaction tube contains an oxidizing mixture of iodine pentoxide and fuming sulphuric acid which reacts with the methyl bromide in the air sample to liberate bromine. The liberated bromine then impinges against the test disc which is impregnated with an aqueous solution of fluorescein. The action of bromine on fluorescein produces a pink color which is developed by adding a drop of aqueous sodium hydroxide to the test disc. By comparing the color on the disc against a standard color chart, a quantitative estimation of the methyl bromide in the breathing air is obtained. In detecting the presence of chlorinated hydrocarbons such as carbon tetrachloride and trichlorethylene, the same procedure is followed except that the test disc is treated with a solution of orthotolidine and compared with its corresponding color chart. The instrument incorporates established chemical reactions in its design. The oxidizing material is commercially known as hoolamite and was originally prepared by Lamb and Hoover in 1917. The color reac-

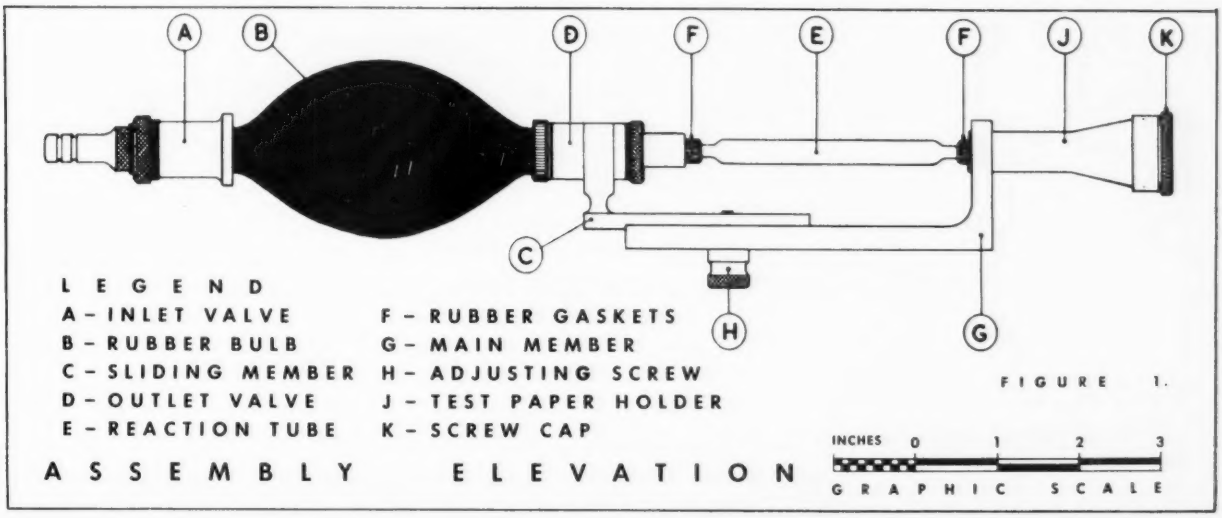


FIGURE 1.

tions employed for the identification of the bromine is a common laboratory procedure. By successfully combining these established methods in one instrument, a practical quantitative procedure has been developed which will be useful in those industries where methyl bromide is a potential hazard.

Methyl bromide is a highly toxic gas which is occasionally used without full knowledge of its dangerous properties. Persons inhaling methyl bromide receive no warning as the gas is odorless and colorless at ordinary temperatures and pressures. The onset of toxic symptoms usually occurs after a latent period of several hours. In the body the chief action of methyl bromide is upon the central nervous system. Resulting symptoms may include dizziness, visual disturbances, excitement or mental confusion, headache, paralysis, polyneuritis, convulsions and coma. The systemic effects resulting from methyl bromide poisoning may persist and incapacitate the individual for a long time. Methyl bromide is used as a refrigerant, fumigant, insecticide and as a fire extinguisher. In the past intoxication with methyl bromide has been reported in all of these uses, emphasizing the need for the strictest control measures. The simple detecting device which will now be available, will greatly facilitate control. The new instrument will also be useful in measuring concentrations used in fumigating processes. As an example, methyl bromide is being widely used in concentrations of 5,000 to 30,000 ppm to fumigate the holds of ships. Up to the present there has been no practical method for ensuring that adequate concentrations of the gas were being used. The present apparatus can be adapted to measure concentrations in this range and can thus serve to control the concentrations required for fumigation as well as detecting residual concentrations after the ship's hold, railway car or chamber has been ventilated.

The adaptation of this method to the detection of chlorinated hydrocarbons will greatly extend its field of use. Because of their useful solvent properties, the chlorinated hydrocarbons are widely used in industry. However, their high toxicity creates a potential hazard in every industrial process in which they are used. The ready detection of toxic concentrations will be a valuable aid to existing control measures.

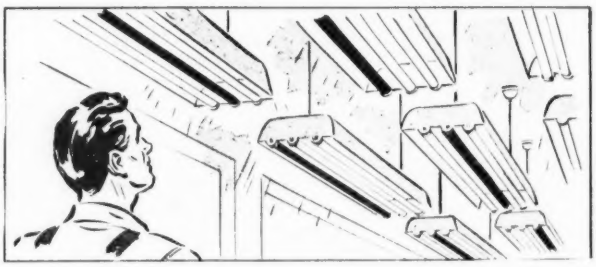
Disposal of used *Fluorescent Lamps*

Connecticut Health Bulletin
62: No. 8, 209, 1948

The beryllium present in the phosphor coating on the inside of fluorescent lamps is in amounts ranging from a fraction of 1% to approximately 4%. It is now recognized that care should be exercised in the breaking up and disposal of used fluorescent lamps. In this article the Bureau of Industrial Hygiene of the Connecticut Department of Health draws attention to the fact and refers to the precautions recently drawn up by the Technical Advisory Committee on Beryllium, a committee appointed during the past year by an executive committee representing the beryllium industry. The recommendations were designed to reduce unnecessary exposure to phosphor dust and to prevent injury from broken glass with entry of phosphors beneath the skin. In no instances should attempts be made to salvage or reclaim the used phosphors from lamps. Two situations are covered. In both full protective goggles should be worn and the operations carried out in such fashion or with such protection as to prevent the possibility of injury from flying glass. The recommendations are as follows:

Situation 1. This covers the breaking of a small number of fluorescent lamps daily or intermittently during which there is exposure for a matter of minutes only:

a. Break all tubes out of doors in a waste disposal area or in a waste container.
b. Avoid breathing dust and vapors that may evolve.



Situation 2. This will cover the breaking of large numbers of fluorescent lamps, either intermittently or regularly, where hours may be occupied in the operation.

a. Break lamps out of doors in waste disposal area or in ventilated hood. To avoid unnecessary dust, the breakage is best done within the waste container.
b. The operator should be supplied with and required to wear a respirator approved by the United States Bureau of Mines for toxic dusts.
c. Ultimate disposal of the broken lamps should be such that the public and others will not be unduly exposed to powders. In situations where it is necessary to break lamps within buildings, it should be done in an isolated room and in a hood so as to minimize escape of dusts. Sufficient exhaust ventilation should be supplied to the hood to provide an air intake of at least 125 linear feet per minute at the breathing level.

It is recommended that broken lamps be thrown into water or in a dump rather than disposed of in an incinerator. Reference is made to the fact that significant amounts of mercury vapor may be found in the air during the breaking up of these lamps. Where there is frequent or continuous exposure, measurements should be made of the amount found in the air during the operation and if the level is high, protection should be provided for the operator.

Division of Industrial Health
Ontario Department of Health

GROUP DETECTION of *Lead Absorption* among exposed workers

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Division of Industrial Hygiene
Quebec Ministry of Health

The evaluation and improvement of methods for the detection of early physiological changes produced by toxic substances or abnormal physical conditions is a necessary task for the development of preventive industrial medicine. Unfortunately there are relatively few methods of this kind which can be used for this purpose. Textbooks on toxicology deal mainly with the clinical symptoms of definite intoxication. However, if preventive measures are to succeed, methods for detecting early absorption must be further developed. The effectiveness of existing tests in revealing subclinical phases could be utilized to better advantage through statistical methods applied to data gathered in the field.

In the present case a method for the group control of workers exposed to lead has been used by our division. Of all the plants in our area using lead, five were chosen with the most adverse records according to compensation claims and environmental surveys. Monthly blood smears of all workers at these plants are taken by our technician; the stippled cell counts are determined and tabulated as shown in Table 1.

The trend in stippled cell counts for each man is readily noted. When the count reaches 5,000 stippled cells per million R.B.C., the plant physician is notified and the man is transferred to another job. Notification may be given before the 5,000 mark is reached if the trend appears to be increasing steadily.

Though the stippled cell determination is not conclusive evidence for lead absorption in any one individual, its significance is greatly increased when applied to a group. It is true that a high stippled cell count in a single worker may be due to other reasons than lead absorption but when applied to a group, a high mean count indicates, in our opinion, excessive lead exposure for the group taken as a whole.

TABLE 1

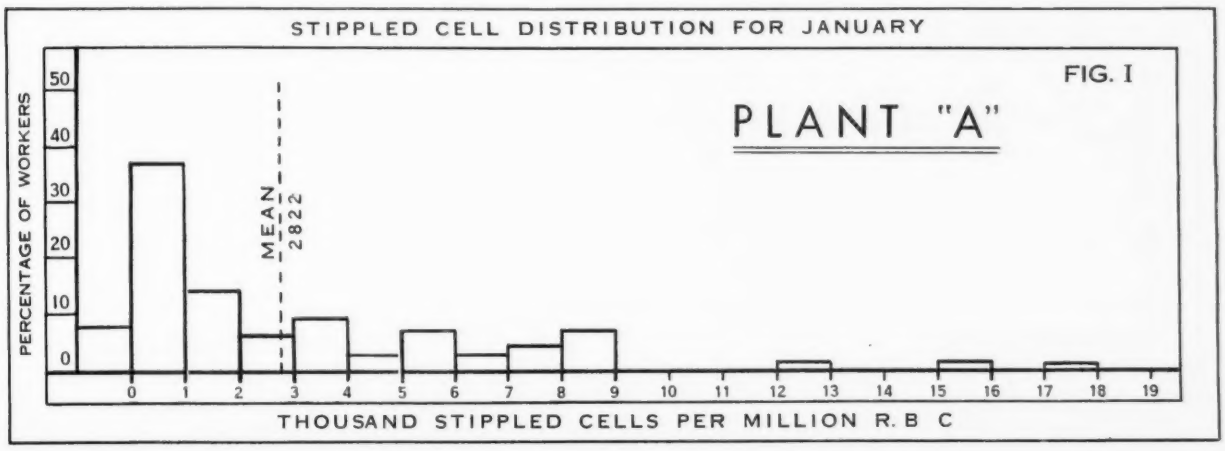
NAME OF WORKER	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
	THOUSAND STIPPLED CELLS PER MILLION R. B. C											
A	0	0	0	0	0	0	0	0	0	0	0	0
B	0	0	1.0	1.2	0	0	0	1.0	0	0	0	0
C	0	1.0	2.0	3.2	4.0	6.0	4.1	1.0	0	0	0	0
D	1.0	0	1.0	1.2	0	0	1.1	1.1	1.0	0	0	0
E	1.0	2.0	4.1	7.2	4.2	1.1	1.0	0	0	1.0	0	0
F	0	0	1.0			1.0	0	0	0	0	0	0
G	2.0	3.9	6.6	2.2	3.5	2.1	1.0	1.0	0	0	0	0

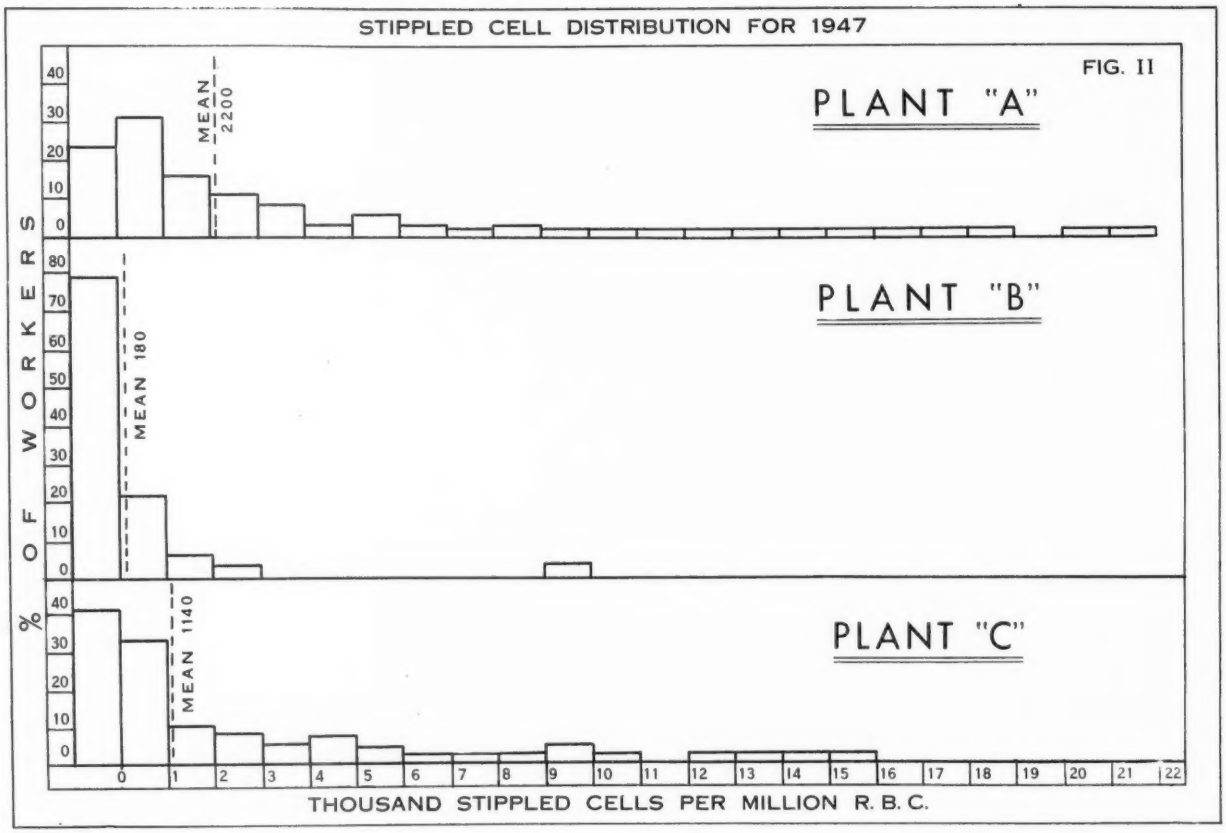
Change of job.

For this reason a monthly histogram (Fig. 1) is made showing the mean and the percentage distribution of stippled cells for each plant.

This monthly record indicates the trend and degree of exposure in each surveyed plant and enables a comparison to be made between them. In this way, the effectiveness of control measures can be assessed and appropriate action taken if necessary.

Figure II shows the mean and percentage distribution of stippled cells for one year in three plants. The record for plant B approximates that of a normal group of workers not exposed to lead. For this reason workers in plant B are being examined for stippled cell counts every two months instead of monthly. A chart showing the monthly variation in mean stippled cell count for each plant is reproduced in Figure III. This chart enables comparisons to be made between plants. It is sent to each plant and only the graph of the plant receiving the chart is identified. In this way, management may see the extent and trend of the lead hazard in its own plant and compare it with others.





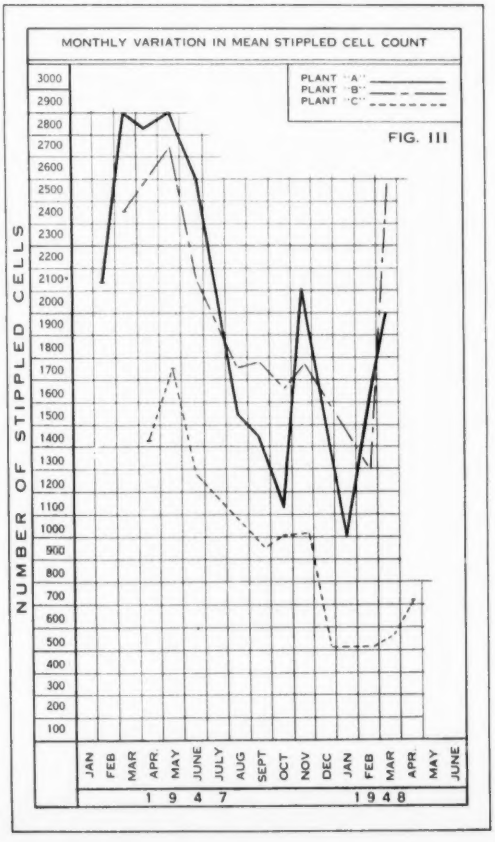
This practice, we believe, acts as an incentive to more efficient control. In addition it allows our division to assess its work and to strive for better results.

Figure III also reveals seasonal variations which occur about the same time in all of the plants. This suggests that the effect of general ventilation might be responsible for the decreasing trend occurring in summer months. Decreased production in the latter part of December may be responsible for the decrease in mean stippled cell counts obtained in January.

Up to now we have used the method to investigate the exposure of the total working force in a plant. But once a reasonable degree of control has been reached, exposure of specific occupational groups within a plant may be considered. The workers are classified as to the place where they work and the same method is used.

When air contamination is high, such refinements in procedure are considered premature. Moreover, the frequent change of jobs among the workers because of the rotational system or other administrative reasons makes such occupational classification difficult and somewhat fallacious.

In conclusion, we believe that an effective application of field data to the control of the lead hazard is obtained through the above procedure.



AN ADDRESS TO THE ANNUAL MEETING OF THE CANADIAN MANUFACTURERS ASSOCIATION

Total Health

IN AN INDUSTRIAL MEDICAL SERVICE

By H. M. HARRISON, M.D.
Medical Director, George Weston Ltd., Toronto

I appreciate the opportunity of appearing on the conference of employer and employee relations. I feel it significant that your program committee included industrial medicine on the agenda. Ten years ago a talk like this would be a comparatively easy one to prepare, but today, when so many of you know a great deal about the subject, the task is not so easy. However, many of you will agree with me that an efficient medical service plays an important role in employee relations. That role is a neutral one. Though paid by management, a medical department operates in the interest of employer and employee. I hope to show you how this can be done by relating some experiences and the opinions formed by 12 years of industrial medical practice in various types of industry. As the chairman has stated, I am engaged as an industrial physician in four different types of industry: printing ink, paint, tool and the food industry. With reference to the food industry I want to correct a prevailing impression, which is that this branch of industry is compelled by law to provide medical service. That is not correct. The food industry, in regard to a health and medical service, is in exactly the same position as the metal or any other branch.

With no idea of trying to impress you I should like, however, to give you some conception of the amount of work done by a physician active in industrial medicine. In my own case, examinations and consultations total about 6,000 to 8,000 a year among 1,400 employees. It is from such a group that I have drawn certain conclusions. Before stating them I should like you to understand what I mean by "health" and will, therefore, give you the definition of health as set out in the constitution of the World Health Organization. It is as follows: "Health is a state of complete physical, social and mental well being, not just the absence of disease or infirmity." Mental and social health are given equal prominence with the physical, and it is mental and social ill health that will be mainly dealt with. This does not refer to the inmates of institutions or those who should be there, but to the employee who is worried, harried by fear, maladjusted, who has domestic unhappiness, etc. All classes of society have such people but among the workers this is more prevalent today than before the war. Today there are more unhappy people than there ever were. The causes are many and only a few are mentioned here.

1. Housing. The present situation results in overcrowding and, as a consequence, frustration, lack of privacy, domestic breakups, etc. You do not need to be told that the productivity of such workers is certainly not at its maximum in such cases.

2. Feeling of insecurity. True, employment is high but the workers have not forgotten some of the more difficult times when they were on relief.

3. This last cause has been a gradual one, accelerated since the war. This refers to the lack of skill required in many industries. The technical improvement in industry is resulting in the machine achieving what the worker formerly accomplished. This has resulted in a loss of sense of achievement and importance and is having serious repercussions in our industrial and community life.

Now the impact of one or more of these factors upon the worker causes anxieties, worries, etc., which disturb his mental state. These upsets result in psychosomatic disturbances. Psychosomatic simply means the abnormal effects of the mind upon the body. The physical, through the influence of the mental, causes the body unit to function in an abnormal manner. These upsets are very real to the person affected and manifest themselves in many different ways.

It is my purpose, however, to show you the part an industrial medical service can play in handling such employees. Authorities estimate that 30% of employees belong to this group which makes up over 80% of the calls on the medical department. They are the ones who are late or off work upon the slightest provocation. Some are indifferent workers. The symptoms complained of upon attendance at the medical department are headaches, fatigue, various aches and

pains, etc. They always blame their work for their indisposition and always have a grievance against the plant or somebody in it. I should like to give you two or three case histories just to illustrate:

1. **Ann.** Complaint—tired all the time, headaches, blamed her work and wanted two weeks off, on insurance of course. This girl had been with us five years and was a skilled worker. Five other girls depended upon her efficiency to keep the production at top level on that line. As in all cases, one must be sure that there is no physical disability. If the employee has not had a recent examination it must be done first, even if the doctor feels certain about the results. That reassurance must be given to the employee. This girl was examined—then I talked to her. She denied any worry or anxiety at all. However, I suggested she think it over and come back next day to talk to the nurse, which she did. There was a complicated home situation which had resulted in her leaving home. With the help and advice of the nurse the situation was straightened out and the girl returned home. Fatigue and headaches disappeared. The important result was that her work did not suffer, nor did the work of the five other girls.

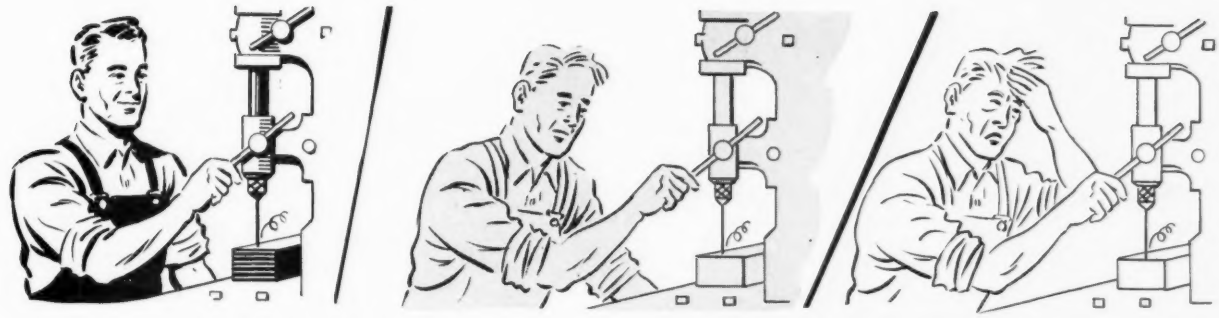
2. **Ben.** Married with two children. All the usual complaints—daily headaches, aches and pains, frequent visits to the medical centre. Examination was negative. The trouble in this case was housing. The family was living in one room and Ben slept on a cot in the public hall of the rooming house. Of course we could not clear up his housing problem but he had confidence in us and accepted our opinion that it was living conditions which were causing his troubles. Proof came when six months later he was able to get a small house. Now we only see Ben on rare occasions. In this case also, when this employee first visited us, he blamed his work and wanted time off, claiming he was sick. This boy had a fair degree of intelligence and understood things when they were explained to him. Incidentally, that was two years ago, and today he is foreman in his department.

3. **George.** George had the same symptoms. He is a fine looking chap. About eight months ago he started coming down to the nurse on the average of two or three times a week, getting a headache pill and telling her how tired he was. He did not want to see the doctor but finally she told him he must. Following the examination he was assured of his good physical condition. I told him that his troubles lay elsewhere and asked him what his worries were. For half an hour he poured out his grievances against society at large, including the factory. The interesting part was that he did all the talking. When he had run down I looked at him and said, "George, isn't it funny that everything is wrong except yourself?" He looked at me for about 30 seconds, then jumped up and shook hands with me, and thanked me for all I had done for him which—as you see—was just letting him blow off steam. I had told him that the fault all lay with himself and that he should get himself adjusted. In the usual case this is easier said than done, but this chap took it to heart. I have not seen him for six months, nor has the nurse. Three months ago the personnel department informed us that he was now promoted to assistant foreman. This man cured himself.

Handling problems such as these is really putting into practice what you can term—understanding human behavior. This subject is now receiving attention here at the University of Toronto in the industrial relations department under Professor Bladen.

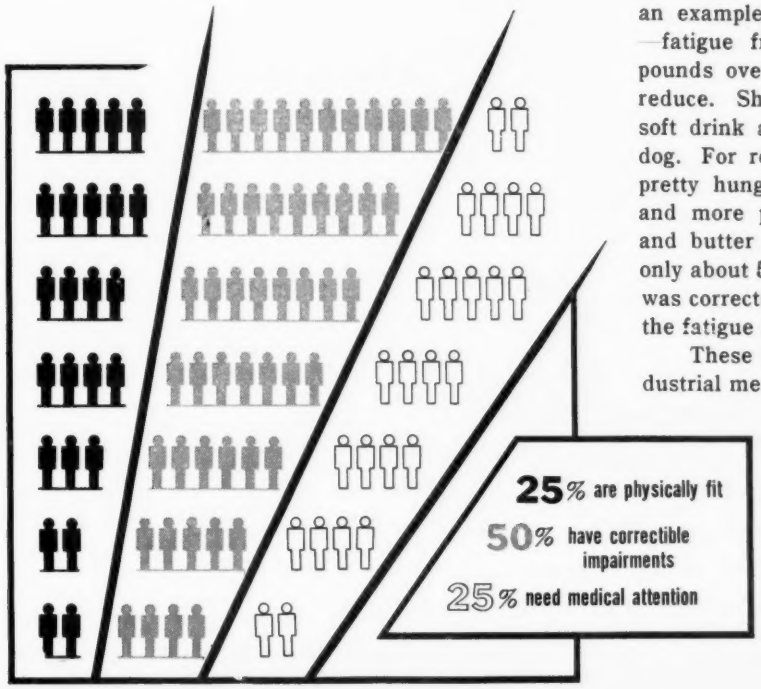
Here is the case of Sam, a skilled employee 40 years of age. The foreman complained that his work was falling off and sent him in to us. We knew his mother was in the asylum. Results of the preliminary examination revealed a serious nervous condition. The problem was too much for our department and he was referred to a competent psychiatrist and given a month's leave. He returned to work three weeks ago, an apparently normal man, able to do his work as well as formerly. It is estimated that it costs $500 to train a man to do his job. This sum the company saved.

I have now spent over half my allotted time on the subject of minimal mental complaints. My excuse for doing so is that they are important; important from three standpoints. (1) The employee is kept on the job and production is not affected. In the four cases I gave you, production would have suffered until a trained person could be fitted in. (2) It is from such cases that grievances develop which, as you know, do not stop where they start. They often reach and occupy a great deal of time of top management, particularly when they go to arbitration. In spite of the



fact that the employee only spends one-third of his daily hours at work, he rarely attributes his fatigue, headaches, etc., to his personal frustration, domestic affairs, etc. Incidentally, I have never come across anybody who is physically and mentally fit, who suffers from fatigue from an eight-hour-day's work. (3) Three of the four I mentioned wanted time off, and they would have got it if the company had not had a medical department. They would have taken their complaints to the foreman, fortified by a certificate from an outside medical practitioner. Off work and rest without straightening out their mental kinks would have done more harm than good.

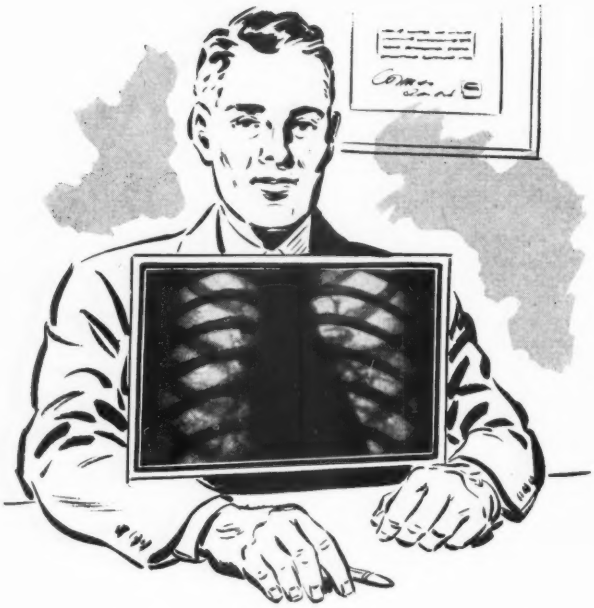
Another harmful result with this type is found in your accidents. Do you realize that most of your occupational accidents occur at home? That statement is not as paradoxical as it sounds. Most of you know the work of Heinrich on this subject, and the result of these studies puts mental maladjustment high in the causes of accidents.



There are other causes of fatigue, of course, than those mentioned. Fatigue is frequently the result of infections. Take the case of Jimmy B. This chap is married and has two children. He was late for work two or three times a week and lost, on an average, one day a week. His physical condition was satisfactory with the exception of the fact that he had a great amount of dental infection. His statement was that he could not afford to get this attended to. However, one day I had him in and pointed out to him that the amount of time he was losing would more than pay for the dental work I was asking him to have done. He went ahead and had his teeth fixed. We have in this factory a plan by which the employee can assume a debt up to $30 for dental work. The company pays the dentist and the employee pays the debt out of his wages in regular amounts. Jimmy utilized this plan and since then rarely loses a day's work, nor has he been late. His fatigue is all gone. This was a case of fatigue from a physical cause — infection.

Sarah J. is another example of fatigue. This is an example of a very large group in industry today —fatigue from malnutrition. Sarah was about 40 pounds overweight and had taken it upon herself to reduce. She did not have any breakfast but had a soft drink at relief period. For lunch she had a hot dog. For relief in the afternoon, as she was getting pretty hungry, she had two or three chocolate bars and more pop. For dinner at night she had bread and butter and a full course meal. She was getting only about 5% of the essential food elements. Her diet was corrected. She lost weight on a balanced diet and the fatigue and other symptoms disappeared.

These examples of fatigue are common in our industrial medical service.They are the common causes which an efficient medical service will correct. Let me add just this: The fatigued worker is not earning 100% of the wages he receives. Careful surveys have shown that in 100 employees only 25 are physically fit; 50 have correctible impairments which, as long as they are left, impair the worker's efficiency; 25 are in need of medical attention. I have heard and seen those figures given by



people who know. I have also found it in my own experience when taking over a new contract.

I gave you one illustration of malnutrition. I wish I had the time to go into this question of nutrition among workers but the subject is a very large one and time will not permit. Suffice it to say that I am convinced that faulty diet is a large factor in ill health. I have investigated over 20,000 individual diet reports from workers in the last eight years. A careful analysis of 1,000 which we did a year ago showed only 4% had a balanced diet. Fourteen per cent lacked sufficient protein. The other six essential food elements were lacking in 30% to 70% of the diets.

Every employee submitting a report had his diet gone over by the nurse in the factory. We don't say that we correct all the dietary habits of our employees but we do know there has been a definite improvement. One of my factories has a well-equipped cafeteria and we use twice the amount of whole wheat bread and three times the amount of milk we did six years ago. A great many factors enter into lowered absenteeism but the medical program is a big factor. This factory had only one-third the absenteeism in 1947 that it had in 1942. Just this week I found a woman with the following diet, which contains only 5% of essential food for the day:

Breakfast....Coffee
Relief .....Coffee and doughnut
Lunch.....Soup
Relief .....Coffee
Dinner .....Meat and potatoes, carrots and peas
Bedtime.....Coffee

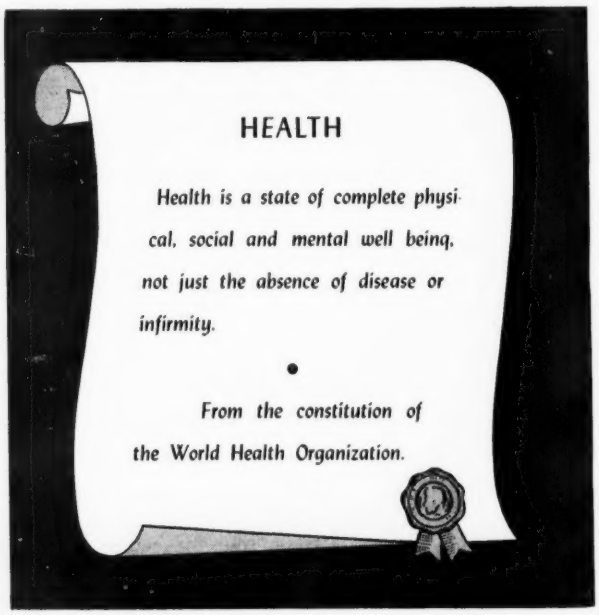
Is it any wonder that she complained of being very tired and that examination showed a marked degree of anæmia? No wonder the floor lady complained that Mrs. M. was a very poor worker. This woman was quite surprised when told that it was milk, eggs, etc., she needed and not aspirin and tonics.

I wish to emphasize what my colleague, Doctor Cruickshank, has said about the care of the executive group. The executive is where he is because of what he knows—you can't easily replace him. A competent medical service keeps a watchful eye on them—some are seen more frequently than others. Electrocardiograms and chest x-rays should be done every year. Five years ago one of the higher executives in one of my companies had his chest x-rayed at one of our regular chest surveys through the auspices of our provincial health department. A minimal but active tubercular infection was discovered. He was off work eight months but today is physically fit, an early case of TB cured. If he had waited until symptoms developed he certainly would not be working for us today.

There is another point I want to stress and it is this: a medical service is not a welfare project. Any industry which embarks on a project like this with the idea that it is a nice thing to do for the employees, will be doomed to disappointment. A medical health service must and will pay a profit and that is the only basis upon which it should ever be started.

In closing I want to make one final point. Many factories employ a nurse and not a doctor and feel that they have a medical service. My colleague has emphasized the need for a doctor in pre-employment and periodic examinations, and I am sure you can see that in the work I have described, a physician is essential. A nurse without a doctor is not a medical service no matter how you look at it.

The converse is also true. A well-trained nurse and a physician interested in people as human beings are essential for proper teamwork and will result in an efficient service. Such a service is nothing more nor less than bringing health in its broadest understanding into the reach of the worker.


HEALTH
Health is a state of complete physical, social and mental well being, not just the absence of disease or infirmity.
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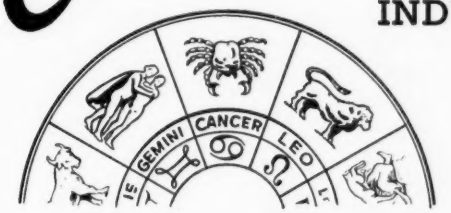
From the constitution of the World Health Organization.

Cancer OF THE RESPIRATORY SYSTEM IN THE UNITED STATES CHROMATE - PRODUCING INDUSTRY...



WILLARD MACHLE and FREDERICK GREGORIUS
U.S. Public Health Report 63: No. 35, 1114, 1948

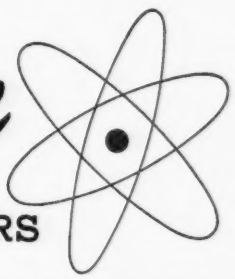
That there is a relationship between lung tumor and employment in the chromate-producing industry has been established recently in the United States. Previous recorded experience of the incidence of respiratory system tumor associated with exposure to chromates has come from continental Europe. The American study was initiated by the health committee of the chromate industry following the discovery in 1947 of the existence of high rates for lung cancer among the employees of a large chromate-producing company. It included all five companies now engaged in the extraction of chromates from ore. The results leave no doubt as to the hazard; the findings are presented in this article which the authors offer as a contribution to the epidemiology of occupational cancer.

The authors discuss in detail the processing pattern, the chemistry and the principles of operation in all the plants. Tables are included to present the findings. The following points are of special interest:

1. It was reported that 21.8% of all deaths in the chromate industry were due to cancer of the respiratory system. This ratio is 16 times the expected ratio of 1.3%. The individual ratios in five of the six plants ranged from 13 to 31 times the normal.
2. The crude death rate for cancer of the lung was 25 times the normal—the range of excess for the various plants being from 18 to 50 fold.
3. In five of six plants the death rates for lung cancer in the group 50 years of age and under ranged from 20 to 70 times that for a comparable group.
4. The mortality rates for lung cancer at ages over 50 ranged from 10 to 40 times that for a comparable industrial group.
5. The high rate for cancer of the respiratory system results in a high rate in the industry for "cancer —all forms". Due to the small number of deaths there are no convincingly significant or consistent abnormalities in the rates for cancer in sites other than the lung. From the data at hand it would appear that the problem in the chromate industry is limited to the cancers of the respiratory system. Although 66 of the 193 deaths in our group and period of study were due to cancer (a ratio of 34.2%), 42 of the deaths were from cancers of the lung. If these are excluded from consideration, then the ratio of deaths from all other cancers becomes 12.4 % for the chromate industry—slightly less than for a comparable industrial group (15%).
6. One plant handling only bichromates, chromic acid, and a tanning compound had an experience of 1,853 male-years of exposure with 33 deaths, none of which was due to cancer of the respiratory system. This suggests that the mono-chromates may be the compounds responsible for lung cancer.
7. The occurrence of nasal irritation and perforation does not necessarily imply exposure to kinds and quantities of chromium compounds capable of producing lung cancer. Rates for nasal irritation of 14.4% and for septal perforation of 15.2% may occur among exposed workers with no lung cancer reported.

Abstracted by the Division of Industrial Hygiene
Ontario Department of Health

RADIUM TYPE Static ELIMINATORS



Within the past year radium has found a new industrial use in Canada, the principal field of application being the printing, paper and textile trades. In these industries, "static" (not to be confused with radio interference) is something of a problem. It commonly arises where non-conducting substances are subjected to frictional processes in a dry atmosphere. Incorporated in a thin metallic strip which is mounted close to the frictional process, the radium emits its rays into the surrounding air, thereby causing ionization, a condition unfavorable to the existence of static charges. All such installations in Ontario are inspected by the Division of Industrial Hygiene, Ontario Department of Health, to ensure that necessary safety and health precautions are observed.

Dust Analysis Service

OF THE INDUSTRIAL HEALTH LABORATORY, OTTAWA

The laboratory of the Industrial Health Division, Department of National Health and Welfare, is now equipped to do rapid quantitative analysis of industrial dusts for free silica content. A recently installed geiger-counter x-ray spectrometer is now in operation and will be used exclusively for the analysis of dusts submitted for examination by Canadian industries. Any industry may use this service by submitting dust samples to its provincial department of health which will forward them to the federal laboratory for analysis. It is essential that industries submitting samples use proper methods for obtaining them. In many industrial processes the raw materials being handled by employees and the air conditions of the working environment may be subject to considerable variation from day to day. Hence sampling must provide a statistically accurate picture of current conditions. The following suggestions are made as a guide to sampling.

Sampling of solid material in a mine should be done by collecting rock from specific working locations. Cut off sampling in the mill may be done to give an average silica content of the rock being milled at a particular time. For both these sampling methods one representative sample of two pounds from an eight-hour cutoff on each of six days in any one month of operation is desirable.

These should be reduced by the coal pile method and ground to pass a 200 mesh screen. A description of the coal pile method may be obtained from the division on request. Local conditions may indicate other sampling techniques to technical personnel of the organization.

The minimum amount of material on which x-ray spectrometry may be carried out is 0.15 gms. Hence, this is the minimum weight of air-borne dust to be collected by an air sampling technique. The number of samples to be taken in any one location depends upon a variety of factors too numerous to mention. The guiding principle should be to obtain a representative sample of air borne dust at breathing level in positions as close as possible to where employees actually work. It is suggested that air be sampled once a day for six days in any one month of operation. Air-borne dust may be collected by means of the electrostatic precipitator, by the salicylic acid filter method, or by the high volume air sampler of Silverman and Viles.

The salicylic acid filter has been described in the Transaction Series Bulletin No. 6, 1946, of the Industrial Hygiene Foundation. The high volume air sampler of Silverman and Viles has been described in the Journal of Industrial Hygiene and Toxicology, March 1948. A description of these methods may be obtained from the Industrial Health Division, Department of National Health and Welfare, Ottawa.

When it is not possible to obtain air-borne dust samples, settled dust from rafters, ledges or shelves in locations where employees work may be taken and submitted for analysis. It must be borne in mind, however, that settled dusts are not necessarily representative of air conditions at breathing level.

Occupational Disease IN DIFFERENTIAL DIAGNOSIS

H. T. CASTBERG, M.D.—U.S.P.H.S.

Reprinted from the Industrial Hygiene News Letter through the courtesy of the Industrial Hygiene Division, U.S. Public Health Service, Washington

A patient's occupation is frequently a significant clue to his physical condition. A knowledge of his work, work history and the materials to which he is or has been exposed may be all important in the differential diagnosis of an illness.

Occupational History

To obtain information concerning these factors, a careful occupational history must be a part of the present and past medical history. The occupational history must be detailed and include the patient's total work history. Not only is the present work important but information on all his previous jobs back to the time he left school or took his first job.

From experience it has been found that it is better to obtain information concerning the present work first. Most persons are able to give data concerning their present occupation in more detail and more accurately than they can for previous occupations.

Next, information is obtained concerning the previous job. Each previous employment is then investigated and recorded in reverse chronological order.

It is more logical to ask a person, "What is your present work, what do you do now?" than to ask him immediately to recall work he did several years ago. He is much more likely to remember details of employment in previous jobs after he has talked about the more recent one.

When an occupational history is being taken, it is useless, many times, to learn merely the name of the job. If a man says he is a molder in a foundry, it has no significance unless the physician is acquainted with the work of a molder and knows what the specific conditions are surrounding that particular job.

In obtaining an occupational history, the purpose is to discover what in the working environment will affect the health of the worker. It is important to learn (1) number of years or months spent at each occupation; (2) the hazardous materials in the form of dusts, fumes, gases and vapors, with which he works; (3) the concentrations of these materials in the atmosphere; (4) the length of time of exposure to these materials each day; (5) if there is exposure to excessive noise, heat, glare, ultraviolet rays, radium or x-ray; and (6) control measures used to reduce or eliminate exposure.

All of these items are important in evaluating the significance of an occupational exposure. For example, serious illness can be produced by exposure to lead compounds in the manufacture of storage batteries. Work with the dust of lead compounds when uncontrolled by protective measures such as local exhaust ventilation is very hazardous. However, the same job, when proper local exhaust ventilation is provided is perfectly safe. Similarly, even if local exhaust ventilation is provided, the job is not safe unless the ventilation equipment is in proper working order and is doing the job it is designed to do.

Every physician cannot visit the plant where each patient works, but in many instances such visits are extremely valuable. Certainly, if there is some doubt about occupational origin of an illness, such a plant visit is essential. In addition to the plant visit it is sometimes necessary to obtain information on the concentration of a hazardous dust, fume, gas or vapor in the workroom atmosphere. This information can only be obtained by proper industrial hygiene air-sampling procedures. In many instances the information may not be available from the plant but the state or local industrial hygiene division may have it. If the work has not actually been done in the particular plant the division should be able to provide this information after a study of the plant has been completed.

Knowledge of Occupational Diseases is Necessary

According to occupational disease reports received by health departments it is apparent that too often physicians handle occupational diseases in a much too empirical fashion. If the patient indicates that he is working with lead compounds the diagnosis is much too frequently given as lead poisoning without adequate investigation or study.

It is probably understandable why incompetence exists in connection with occupational disease diagnosis. One reason is that very little attention is given to occupational disease in medical education. Another is the fact that in the past the usual practising physician only occasionally was confronted with an industrial case of this type and therefore took little specific interest in it. But now the average physician sees many more cases of occupational origin because of industrialization of the country. Therefore it is important that every physician understand the diseases which can be produced by industrial exposures.

The diagnosis of these diseases is not much different from the diagnosis of other diseases of non-occupational origin. Each toxic substance used in industry has a specific action on the internal organs or systems and presents specific symptom complexes and signs which are known. To be sure, there are many new materials whose effects are not as yet well known. However, work is constantly being done by research groups to give us that information.

A large heavy exposure to benzol will produce symptoms and signs of neurological origin while long standing "chronic" exposure will cause probably none of the neurological symptoms but will produce definite hematopoietic effects such as anemia and an aplastic blood picture.

Problems in Differential Diagnosis

It is interesting and informative to notice how materials which cause occupational diseases produce symptoms and signs very similar to other diseases of non-occupational origin and must be considered in any differential diagnosis.

Blood — Stippled cells, for instance, are found in exposures to lead, arsenic, mercury, aniline and nitrobenzene, but are also found in the blood of patients with any disease causing destruction of red blood cells, such as many anemias and leukemias.

The blood may exhibit the picture normally associated with aplastic anemias from excessive "chronic" exposure to benzol. This is an extremely toxic material which is used in many industrial processes. Exposure to radium, x-rays, and gamma rays by action on the system may produce a similar picture.

Polycythemia may be present from exposure over an extended period of time to industrial hazards which cause inadequate oxygen supply, such as carbon monoxide, the cyanides, lowered oxygen tension, as well as cobalt. The non-occupational diseases which must be differentiated on the basis of this finding alone are polcythemia vera, effects of high altitude and certain chronic cardiac and pulmonary disease.

Nervous System — One of the classical signs of lead poisoning is wrist drop or ankle drop. If a patient exhibits this sign the cause must be differentiated from musculospiral nerve paralysis or peroneal nerve paralysis which can be produced by other non-occupational causes such as trauma or tumor.

Tremor is a common sign which is seen in hyperthyroidism, parkinsonism, and senility. But it is also an extremely important sign when associated with other symptoms and signs in mercurialism and manganese and carbon disulphide poisoning.

Manganese can produce gait disturbances and other neurological signs which may be indistinguishable in themselves from tabes dorsalis or multiple sclerosis.

Severe character changes can be produced by manganese, such as scanning speech or marked irritability, irascibility and extreme nervousness by mercury or carbon disulphide exposure. Even psychoses are produced by such industrial poisons as carbon disulphide. Mercurialism is almost indistinguishable from hyperthyroidism.

Exposure to such solvents as trichlorethylene, carbon tetrachloride and others have a narcotic action similar to alcohol. Cases have been reported in which workmen have been arrested for drunkenness when the worst that has happened was that they had been working over a degreasing tank of trichloroethylene.

Severe encephalitis can be produced by heavy exposure to lead which is indistinguishable from other encephalopathies.

Lungs — The differential diagnosis of pulmonary disorders causes perhaps most difficulty. Pneumoconioses in various stages or from different causes have varying x-ray appearances. They can be easily confused with such infectious diseases as tuberculosis, mycotic pulmonary infections and pneumonia.

Mitral stenosis exhibits an appearance on chest x-ray similar to early silicosis or asbestosis. Miliary tuberculosis can be confused with nodular silicosis or

siderosis. The nodulocon-glomerate fibrosis of advanced silicosis may be mistaken for malignant tumors.

Liver Damrge — Liver damage is a result of systemic poisoning from such industrial materials as the chlorinated hydrocarbons of these solvents. Carbon tetrachloride is perhaps the most commonly encountered. It is amazing when the toxic properties are so well known that it is used in many industrial plants with no regard to its potential hazard. There are many preparations used industrially which contain carbon tetrachloride mainly to reduce flammability; its presence, however, is not generally made known.

The chlorinated diphenyls and naphthalenes which are used as dielectics also cause liver damage when systemic poisoning occurs from them. In severe cases these will manifest themselves by causing jaundice or high icteric indexes but may be detected by other means when the damage is less severe. In these instances a knowledge of exposure is essential for differential diagnosis from other diseases such as infectious hepatitis or cholelithiasis and thus to prevent errors in diagnosis and treatment.

Kidney Damage — Kidney damage is a common result of industrial intoxication and must be differentiated from kidney damage from other causes, such as Bright's disease and urinary infections. Poisoning from chlorinated hydrocarbons, many of the metals and many other industrial substances cause the appearance in the urine of albumen, casts, red cells, and other products which indicate kidney damage.

Skin — The dermatitis of industry is practically synonymous with contact dermatitis. Most of the dermatoses which develop in industry are the result of contact with either primary irritants or sensitizers. The causes of these dermatoses must be determined in order to effect a cure. Since, in most instances, the most important means of curing a contact dermatitis is removal of the patient from the cause, it is obviously extremely important to know whether the dermatitis is caused by some irritant in the patient's working environment or his home.

Acne, for instance, may be merely acne vulgaris which has no industrial cause. But if it is found on the arms or ventral surfaces of the thighs, where oil can come in contact with the skin, the chances are that it is industrial.

The chlorinated diphenyls and napthalenes produce in persons exposed to them chloracne which may be confused at times with acne vulgaris. This, however, is an entirely different type of skin reaction which requires different treatment.

One of the commonest errors in dermatitis cases is the mistaken identification of industrial contact dermatitis and the subsequent over-treatment which is so frequently given. As was mentioned before, the best cure is removal from the cause followed by bland soothing treatment. Frequently the dermatitis persists and is made worse by the treatment given.

Mouth and Teeth — The mouth is frequently a site for early recognition of effect from occupational hazards. Stomatitis and excessive salivation are early signs of mercurial poisoning. If the physician does not learn from the patient's occupational history that there is an exposure to mercury in his work the condition might well be and frequently is treated as an infection or nutritional deficiency.

The metallic line which appears on the gingival margins is commonly an early sign of plumbism, but it may also indicate extensive treatment with bismuth compounds. It is important to learn the cause.

Workmen exposed to high concentrations of acids in their working environment develop characteristic tooth erosions and caries. These must be differentiated from caries from other causes.

Eyes and Nose — Cataracts may result from occupational exposures. Thus, glass blowers after some years' exposure to the red glowing glass have been known to develop cataracts and must be distinguished from other causes of cataract.

Ultraviolet rays cause severe conjunctivitis with marked photophobia and odema. This must be distinguished from other types in order to give proper treatment. This can only be done by investigating the patients' work.

Perforated nasal septum is a common result of exposure to dichromate mists in an occupation such as electroplating, or from exposure to certain arsenic compounds. It is unfortunate to suspect syphilis when a perforated septum is found which is caused by an industrial exposure.

Abdominal Colic — One of the symptoms which has caused more confusion than many others is the abdominal colic produced by exacerbations of acute lead poisoning. There have been an unfortunately large number of patients who have been subjected to abdominal surgery for appendectomy which was absolutely unnecessary. If the surgeon had inquired into the occupational history and made a few laboratory tests it would have been obvious that the condition was not appendicitis but lead colic.

These examples emphasize again the importance of learning from the patient the work he does and the materials with which he works. Unless such a comprehensive history is obtained, erroneous diagnostic assumptions will be almost unavoidable.

A MESSAGE TO *Industrial Nurses*

With this first issue of the Industrial Health Review it is my pleasure to bring to you the greetings and congratulations of the Public Health Nursing Committee of the Canadian Nurses Association.

The human machine is still the most sensitive and indispensable machine available to industry and as such needs all the care and attention possible. Adults vary tremendously in their ability to decide when they need medical attention and to know when they are enjoying good health. It is amazing how many defects and how many minor ailments people will put up with without doing anything to have them corrected. Sometimes it is due to lack of money, but too often it is indifference or lack of knowledge.

Nurses working in the industries of this country have a great contribution to make to the total health and welfare of the workers of Canada by providing opportunities for correcting these "lacks". To you nurses working alone in industries, may I urge that you make special efforts to take part in the activities of your local nursing group and to keep abreast of developments in nursing, medical care and public health in your province and in Canada.

In some provinces industrial nurses have formed an industrial nurse committee as a sub-committee of the Public Health Nursing Committee. This, I think, is good planning. It enables the industrial nurses to meet and study problems relevant to their jobs and at the same time keep up with what is happening in public health nursing generally and in the whole broad field of nursing.

Dr. Parran stated recently: "As scientific horizons continue to broaden, we must bring medical triumphs from the research laboratory into homes, ships, factories and farms. The public health nurse is indispensable in her role as interpreter of scientific advances in medicine."

We in public health have this role to perform but we as nurses have an equally important job and that is to interpret nursing to the public. Where better can this be done than with adults at their job? Here a nurse has the opportunity not only to interpret nursing but to demonstrate what nurses can do to improve the health and effective living of the individual.

Through the medium of the Industrial Health Review much can be accomplished, I am sure, to show that industrial health services are a part of a total health program for adults.

Miss Trenna G. Hunter
Chairman
Public Health Nursing Committee
Canadian Nurses Association

RESULTS OF *Dust Survey* in Alberta Coal Mines

J. P. WINDISH, Industrial Hygiene Chemist
Alberta Department of Health

During the years 1945, 1946 and 1947 the Workmen's Compensation Board of Alberta reported a total of 36 cases of permanent disability due to silicosis in coal miners. In an effort to discover the sources of the dust producing the disease, the Department of Health made a survey of dust conditions in 13 representative mines in the province, covering the Crowsnest, Lethbridge, Drumheller and Mountain Park areas. These 13 mines employ over 6,000 men or more than two-thirds of all the miners in the province.

Since Alberta coal contains no free silica, the dust causing the disease in Alberta does not come from the extraction of the coal itself but from the incidental operations in coal-mining which involve the breaking of rock containing free silica. The 13 mines discussed here include practically all of the mines in the province where significant amounts of rock are removed and an analysis of their dust conditions will therefore give a fairly complete picture of the possible sources of silicosis in Alberta's mines.

A variety of rock-removing operations are found necessary, some mines taking out as much as one car of rock for every ten cars of coal. Some drive tunnels in the solid rock, to serve as main entries and haulageways, while others drive their entries in the coal seam. However, if the coal seam is not thick enough, some of the adjacent rock has to be taken out to provide sufficient head room. In pitching seams such as are found in the mountain areas, this is done by drilling holes in the rock and blasting it out. In flat lying seams, if the rock is comparatively soft, such as a shale, it may be removed by means of an undercutter.

This is a machine having a flat boom or bar about eighteen inches wide and five inches deep, extending six to eight feet in front of the body of the machine. Encircling this bar is a chain, to which is attached a large number of short picks. The chain is made to rotate rapidly and the bar is then pushed up against the face that is to be cut. As the picks dig into the face, the bar is pushed in further until finally its full length is into the face. The whole machine is then slowly moved sideways, the picks meanwhile digging out the rock and throwing it back for removal. At the end of the operation, there is a hole underneath the full width of the face, about six feet deep and five inches high.

During the survey samples of airborne dust were collected in isopropyl alcohol in the immediate vicinity of the working miners by means of a midget impinger. Only operations involving rock work were sampled. Bulk samples of the rock being worked were taken at the same time and analyzed for free silica content by means of x-ray diffraction. If the rock was found to contain ten per cent or more free silica, atmospheric dust concentrations were considered excessive if they exceeded ten million particles per cubic foot of air (10 m.p.p.c.f.). The concentration of free silica in the rock being drilled and blasted, varied from 23% to 71%, while that in the rock undercut ranged from 7% to 24%.

Dust concentrations for any one operation varied widely both between different mines and within any one mine, but in general, most of the concentrations were excessive. The results of air analyses are given below for various operations involving the removal of rock.

Operation	No. of Samples	Million parts per cubic foot
Wet Drilling	4	10
" "	17	Between 10 and 60
" "	2	100
Entering area after rock blast		Between 12 and 266
Shovelling blasted rock	5	Between 10 and 22
Loading rock by mechanical mucking machine		Between 23 and 61
Undercutting	3	Between 16 and 55
"	6	Between 100 and 400
"	1	900
"	1	8,000

The results of the survey indicate that operations in Alberta mines do give rise to excessive concentrations of dust. Recommendations have included greater use of water in wetting down muck piles and other dusty areas, greater water flows through the drilling machines and, where possible, more effective use of the available ventilation equipment.

Control of silica dust produced by undercutting can be effected either by spraying water on the cutter bar or by cutting in the coal instead of in the rock below it. Although the former method is preferable, the latter method is the one now being tried. The miner is still exposed to a great quantity of dust, but it is non-silicosis-producing coal dust instead of the rock dust containing silica. In all cases it has been recommended that miners exposed to rock dust be required to wear approved respirators until such time as other control methods have resulted in dust concentrations being kept below the recommended limit.

Editor's Note

The use of x-ray diffraction apparatus for the quantitative estimation of silica dust has greatly facilitated the work of the survey by allowing a large number of analyses to be completed. Investigations are continuing and changing conditions are being checked by additional surveys which should assist in evaluating the efficiency of control measures, thus aiding materially in providing a healthier atmosphere.

HEALTH FILMS for INDUSTRY

HEALTH films can be valuable educational aids to an industrial health department. Available in a wide range of general and industrial health topics for lay audiences, these films have the teaching qualities which make audio-visual methods so effective for instruction. They can convey essential information quickly and accurately to a large audience. By presenting actual situations in a realistic manner the films reduce the time needed for instruction and make learning easier and more practical. In most cases health films can be integrated into the larger educational program ensuring that the information presented will result in improved personal and industrial hygiene practices.

Over 200 health films are assembled in the national health film library of the National Film Board. These films obtained from sources in Canada, the United Kingdom and the United States have been reviewed and endorsed by the film committee of the Department of National Health and Welfare. Many of these films are suitable for health education programs in industry as they deal with occupational health hazards as well as general health problems. Among the subjects covered are: women in industry, dust control and silicosis, heat sickness, nutrition, safety in relation to health and the work of government agencies responsible for industrial hygiene.

The catalogue listing the films in the health library may be obtained from Health and Medical Films Section, Distribution Branch, National Film Board, Ottawa. The catalogue describes the contents of each film together with the appraisal of the Department of National Health and Welfare. If you are planning to use health films, information and advice may be obtained from the regional office of the National Film Board located in the capital city of your province (except in the Province of Quebec where the office is located in Montreal).

The following films have been recently reviewed by the federal Industrial Health Division and an outline of each is given below. They are all recommended for general or industrial audiences, as indicated.

MEN IN DANGER — British; 20 minutes.

The film deals with the causes and prevention of industrial accidents and occupational diseases occurring in British industries. Accident prevention devices are surveyed including protective clothing, machine guards and factory maintenance. Coal mining hazards are depicted, showing the training and function of rescue squads. In battery manufacturing, the symptoms of lead poisoning and preventive measures are portrayed. Anthrax, silicosis and cancer of the skin are used as further examples of serious occupational diseases that may be prevented by appropriate industrial hygiene measures. Various industrial health aspects of the factory environment are presented including factory location, medical services, working conditions and the provision of sanitary and recreational facilities, libraries, and canteens. Sir David

Munro, secretary of the Industrial Health Research Board gives a brief discourse on the cause and alleviation of monotony in industry. His points are illustrated by factory shots showing the use of music, alternating work and job placement in reducing monotony. The film is recommended for industrial audiences.

RESPIRATORY PROTECTION — American; 10 minutes.

A conversation between an old and new employee on the use and value of respiratory protection is the technique employed in this film to depict the development of health protection against air contaminants and to dramatize the importance of such protection. A careful explanation is given of the different types of respiratory devices and their adaption to specific contaminants. Emphasis is placed on the responsibility of the individual worker for the proper use, fit and maintenance of the respirator. It is suitable for showing to workers in dusty industries.

THE AIR WE BREATHE — American; 32 minutes.

The film depicts the development of respiratory protection from its earliest beginning to the present day. The human body's dependence on pure air and the sources and hazards of air impurities are indicated. Methods of testing respirators to meet the approval of the U.S. Bureau of Mines are portrayed, indicating the rigorous standards of safety that are required. The importance of proper maintenance in respiratory protective devices is emphasized, showing the practicability of a central maintenance service. The film concludes with a description of the various types of respirators used for specific air contaminants. A clear description is given of the hazard to health inherent in air contaminants and the protection afforded by respiratory devices. In recommending this film for workers employed in dusty trades, the Department of National Health and Welfare does not recommend thereby the products advertised in the film.

STOP SILICOSIS — American; 11 minutes.

The general etiology of silicosis is reviewed for a lay audience showing the origin of dust in various industries and processes including quarrying, mining and foundry operations. The action of silica dust on the lungs is illustrated by animated cartoons.

Preventive measures are shown as they operate in various industries. These include periodic examinations, housekeeping methods, exhaust ventilation, use of respirators and wet drilling. The film is successful in dramatizing the danger of silica dust and in emphasizing the effectiveness of both personal and managerial preventive measures in controlling the silica hazard. Suitable for employees working in dusty trades.

HELP YOURSELF BEAT THE HEAT—American; 11 minutes, color.

This is a personal hygiene film for industrial workers in steel mills and other high temperature environments. Its primary purpose is to instruct workers how to avoid heat sickness. The various precautionary measures are clearly illustrated and include the need for rest and recreation, use of salt and dextrose tablets, baths and clothing, proper nutrition and the avoidance of over-indulgence in food and alcoholic beverages. The main emphasis of the film is on the dietary factors involved.

SAFETY FOR WELDERS — American; 12 minutes.

The various health hazards associated with welding operations are portrayed, including ultra violet rays, sparks, burns and fumes. A wide range of protective clothing and equipment is illustrated, showing its adaptation and use for different welding situations. Inspection and maintenance of equipment are stressed. The film deals briefly with the function of screens and exhaust ventilation with the main emphasis throughout on personal responsibility of the worker. Suitable for showing to industrial workers employed in welding operations.

WHEN DO WE EAT — The National Film Board; 15 minutes.

This film deals in a practical fashion with the nutritional problems of factory workers. Its shots, taken in homes and factories, illustrate good and indifferent eating habits and show the variety of foods needed for a well-balanced, adequate breakfast, lunchbox and dinner. Emphasis is placed on Canada's Food Rules and usefulness of the factory canteen. Scenes of the actual circumstances in which workers eat at home and in the plant, and the simple, clear description of the subject makes this one of the most effective films on nutrition. It is suitable for industrial audiences and the general public.

LIFTING — British; 9 minutes.

This film shows the proper methods for lifting and moving objects of various sizes and weights in situations which commonly occur in industry. Proper stacking, team lighting and load arrangement are dealt with and modern methods of mechanical lifting are illustrated. Load limits for men, women and young persons are given.

Throughout the film the instructions are clear, practical and emphatic. Faulty and correct use of the body in lifting and pulling various types of loads is made clear by repeated demonstrations. Proper shoes and stance and the correct use of back, leg and arm muscles are illustrated in relation to accident prevention and avoidance of strain. The film is recom-

mended for all industrial audiences as well as school and youth groups and the general public.

HELP WANTED — American; 20 minutes.

A comprehensive description of first-aid principles and techniques is given by the use of charts, animated cartoons, lecturer and life-situations. The film indicates the first aid required, showing what to look for, what to do and how to do it. The topics include bleeding, shock, burns, artificial respiration, fractures and moving of patients. All demonstrations are clear and well presented. The film is recommended for junior first-aid groups and the general public.

KITCHEN AND DINING ROOM SAFETY — American; 15 minutes.

This film shows the hazards which face restaurant and kitchen workers. It points out the sources of accidents, burns, cuts, etc., occurring in these occupations and also deals with serving etiquette. Safety precautions such as cleanliness, first aid and proper equipment are illustrated. It is recommended for all workers who handle food.

SAFE DAY — American; 10 minutes.

This film describes a day in the life of a worker, showing the need for being "safety-conscious" at home and at work. The film is fairly realistic in describing common sources of accidents, in various occupations and common-sense precautions that should be taken. Emphasis is placed on personal responsibility in the prevention of accidents. Recommended for general audiences.

FACTORY SAFETY — American; 10 minutes.

The film opens with an address on industrial safety by the president of the National Safety Council. It describes various plant safety measures, including safety provisions in the design of factories and machines, and safety meetings for foremen. Several accident prevention practices are briefly dealt with including housekeeping, replacing of worn parts and the use of goggles, respirators and safety shoes. Recommended for industrial audiences.

A Canadian Book ON OCCUPATIONAL DISEASES

In response to the growing interest in industrial health problems on the part of the medical profession, labor and management, a reference manual on occupational diseases has been compiled jointly by the staffs of the Industrial Health Division of the Department of National Health and Welfare and the Division of Industrial Hygiene of the Ontario Department of Health. This book, which will be published shortly by the King's Printer, Ottawa, is intended to be of assistance to physicians in the diagnosis of occupational diseases and is entitled *A Guide to the Diagnosis of Occupational Diseases.*

The growth of Canadian industry in recent years has been extremely rapid. Not only has there been an increase in our industries, but industry itself has become more complicated and diversified. Many new materials and processes introduced during the war have now become standard features and some of these constitute further sources of potential or actual health hazards for the worker. The control of the working environment and the supervision of workers' health call for a wider knowledge of the potential health hazards in all industries and for enhanced skill in recognizing occupational diseases. A comprehensive program of industrial hygiene requires the combined services of professional and technical people from various scientific fields. In addition to the plant physician and nurse, the modern industrial hygiene team includes chemists, engineers, physicists, as well as factory inspectors, safety supervisors, plant managers, personnel directors and first-aid men. All these people must have some knowledge of the broad field of industrial health in order to understand their special function in a preventive program. The general medical practitioner is also an important member of this team because many of his patients may be industrial workers and he should have a practical working knowledge of occupational factors in the causation of disease.

In this reference manual information concerning occupational diseases has been assembled which should be helpful in diagnosis. A list of occupations with their actual or potential health hazards serves as a reference key and each health hazard is then separately described.

Harmful chemicals are discussed under the headings: Properties, Uses and Occurrence, Mode of Entry into the Body, Physiological Action and Toxicity, Signs and Symptoms.

A brief discussion of occupational diseases, a review of occupational dermatoses and a summary of the various provincial workmen's compensation acts are also included.

It is hoped that this book will fill, at least in part, a long felt need in Canada for a ready reference manual on the diagnosis of occupational diseases.

A PROPOSED UNIFORM *Industrial Hygiene Code*

Many of the control measures required for the prevention of occupational diseases are available today in the established techniques of industrial hygiene. Yet the incidence of these diseases among Canada's working population indicates that these control measures have not been fully applied.

An effective method for disseminating and applying information on industrial hygiene practice has been through the promulgation and administration of reasonable rules and regulations designed to codify the principles and standards involved in such practice. According to J. J. Bloomfield, assistant chief of the Industrial Hygiene Division, U. S. Public Health Service, the main purpose of an industrial hygiene code is "to provide reasonable guides or principles which will enable industry to maintain the health of its workers at a high level. It must also be reconciled with the chief aim of industry — to turn out goods and services in the most efficient way possible so as to achieve maximum production at minimum cost."

Canadian legislation has been developed relating to the control of industrial health hazards and both industry and government have recognized the value of this legislation. At the same time it is realized that a greater uniformity in the regulations governing working conditions in Canada would be desirable.

In the past few years governmental industrial hygienists in North America have been concerned with this problem and have gradually evolved a body of regulations which has been based on scientific research and tested in industrial application. The American Conference of Governmental Industrial Hygienists in which Canadian representatives participate, has prepared a Proposed Uniform Industrial Hygiene Code, which will be considered by those agencies and individuals concerned with industrial health legislation. Any amendments that are proposed will be assessed by the Conference with a view to drawing up the most practical and acceptable code.

The table of contents of the code is as follows:

Part I Introduction
- Sec. 1. Purpose
- Sec. 2. Authority
- Sec. 3. Administration
- Sec. 4. Employer responsibility
- Sec. 5. Employee responsibility
- Sec. 6. Application
- Sec. 7. Appeal for variation
- Sec. 8. Penalty
- Sec. 9. Unconstitutionality clause
- Sec. 10. Repeal and date of effect
- Sec. 11. Definitions

Part II General Provisions
- Sec. 12. Requirements in addition to those specified

Part III Environmental Provisions
- Sec. 13. Control of atmospheric contaminants
- Sec. 14. Infectious agents
- Sec. 15. Illumination
- Sec. 16. General ventilation and temperature requirements
- Sec. 17. Local exhaust ventilation
- Sec. 18. Personal protective equipment
- Sec. 19. Housekeeping
- Sec. 20. Sanitation
- Sec. 21. Service facilities

Part IV Medical Provisions
- Sec. 22. Physical examinations
- Sec. 23. Treatment
- Sec. 24. Immunizations

According to the preface, the code is offered "in the hope that it will serve as a guide leading to increased protection for the health of our working population. Every effort has been made to produce a code flexible enough to meet the constantly changing problems encountered in the field of industrial hygiene. Emphasis has been placed upon the definition of suitable working conditions rather than upon the methods for achieving them. It is a basic code applicable to all places of employment. Specific operations, processes and problems will be covered in more detail in supplemental codes which the American Conference of Governmental Industrial Hygienists plans to develop."

A copy of the proposed industrial hygiene code may be obtained from the Industrial Health Division, Department of National Health and Welfare, Ottawa.

MAXIMUM ALLOWABLE CONCENTRATIONS OF TOXIC MATERIALS

The proposed code includes a list of maximum allowable concentrations of toxic materials which is recommended for adoption as part of the code. A maximum allowable concentration (M.A.C.) of an atmospheric contaminant is the highest concentration which is regarded as having no harmful effect upon

the health of an individual exposed continuously during the working day (8-hour daily exposure) and for prolonged periods of employment. Wherever air contamination exists, the concentration of contaminants should be kept below the maximum allowable concentration for any and all exposures, irrespective of the total time of exposure.

It should be noted that some recommended M.A.Cs. have been determined by actual study of exposures associated with the development of clinical cases in industry. In other instances these hazardous materials have been recently introduced in industry and the M. A. Cs. have been dete mined largely through animal experiments and the results thus obtained may not be directly referable to man. Therefore, as more industrial experience and clinical evidence become available, it may be considered advisable to lower some limits which are now regarded as safe, or to raise others which are found to be lower than necessary.

The M.A.Cs. adopted by the American Conference of Governmental Hygienists in May 1948 are given below. In the words of the proposed code, "the following list of maximum concentrations shall be used as a *guide* in appraising health hazards and in evaluating control of atmospheric contaminants. Every effort should be made however to keep concentrations below these limits for any and all exposures irrespective of the total time of exposure."

MAXIMUM ALLOWABLE CONCENTRATIONS

GASES AND VAPORS

Substance	* P.P.M.	Substance	P.P.M.	Substance	P.P.M.
Acetaldehyde	200	Dichloromethane	500	Methylcyclohexanone	100
Acetic acid	10	Dichloromonofluoromethane	1,000	Methyl formate	100
Acetic anhydride	5	1,1-Dichloro-1-nitroethane	10	Methyl iso-butyl ketone	100
Acetone	500	1,2-Dichloropropane (propylene dichloride)	75	Monochlorobenzene	75
Acrolein	0.5	Dichlorotetrafluoroethane	1,000	Monofluorotrichloromethane	1,000
Acrylonitrile	20	Dimethylaniline	5	Mononitrotoluene	5
Ammonia	100	Dimethylsulfate	1	Naphtha (coal tar)	200
Amylacetate	200	Dioxane	100	Naphtha (petroleum)	500
iso-Amyl Alcohol	100	Ethyl acetate	400	Nickel carbonyl	1
Aniline	5	Ethyl alcohol	1,000	Nitrobenzene	1
Arsine	0.05	Ethyl benzene	200	Nitroethane	100
Benzene (benzol)	35	Ethyl bromide	200	Nitrogen oxides (other than N_2O)	25
Bromine	1	Ethyl chloride	1,000	Nitroglycerin	0.5
1,3-Butadiene	1,000	Ethylene chlorohydrin	5	Nitromethane	100
n-Butanol	50	Ethylene oxide	100	2-Nitropropane	50
2,Butanone	250	Ethyl ether	400	Octane	500
n,Butyl acetate	200	Ethyl formate	100	Ozone	1
Butyl cellosolve	200	Ethyl silicate	100	Pentane	1,000
Carbon dioxide	5,000	Formaldehyde	5	Pentanone (methyl propanone)	200
Carbon disulfide	20	Gasolene	500	Phosgene	1
Carbon monoxide	100	Hentane	500	Phosphine	0.05
Carbon tetrachloride	50	Hexane	500	Phosphorus trichloride	0.5
Cellosolve	200	Hydrogen chloride	5	iso-Propanol	400
Cellosolve acetate	100	Hydrogen cyanide	10	Prophyl acetate	200
Chlorine	1	Hydrogen fluoride	3	iso-Prophyl ether	500
2-Chlorobutadiene	25	Hydrogen selenide	0.05	Stibine	0.1
Chloroform	100	Hydrogen sulfide	20	Stoddard solvent	500
1-Chloro-1-nitropropane	20	Iodine	1	Styrene monomer	200
Cyclohexane	400	Isophorone	25	Sulfur chloride	1
Cyclohexanol	100	Mesityl oxide	50	Sulfur dioxide	10
Cyclohexanone	100	Methanol	200	1,1,2,2-Tetrachloroethane	5
Cyclohexene	400	Methyl acetate	200	Tetrachloroethylene	100
Cyclopropane (propene)	400	Methyl bromide	20	Toluene	200
o-Dichlorobenzene	50	Methyl butanone	100	Toluidine	5
Dichlorodifluoromethane	1,000	Methyl cellosolve	25	Trichloroethylene	100
1,1-Dichloroethane	100	Methyl cellosolve acetate	25	Turpentine	100
1,2-Dichloroethane (ethylene dichloride)	75	Methyl chloride	100	Vinyl chloride	500
1,2-Dichloroethylene	200	Methylcyclohexane	500	Xylene	200
Dichloroethyl ether	15	Methylcyclohexanol	100		

TOXIC DUSTS, FUMES AND MISTS

Substance	† Mg/M$_3$	Substance	Mg/M.$_3$	Substance	Mg/M.$_3$
Antimony	0.5	Fluoride	2.5	Phosphorus pentachloride	1
Arsenic	0.5	Iron oxide fume	15	Phosphorus pentasulfide	1
Barium	0.5	Lead	0.15	Selenium, as Se	0.1
Cadmium	0.1	Magnesium oxide fume	15	Sulfuric acid	1.0
Chlorodiphenyl	1	Manganese	6	Tellurium	0.1
Chromic acid & chromates as CrO_3	0.1	Mercury	0.1	Tetryl	1.5
Cyanide as CN	5	Pentachloronaphthalene	0.5	Trichloronaphthalene	5
Dinitrotoluene	1.5	Pentachlorophenol	0.5	Trinitrotoluene	1.5
		Phosphorus (yellow)	0.1	Zinc oxide fume	15

MINERAL DUSTS

Substance	‡ M.P.P.C.F.	Substance	M.P.P.C.F.	Substance	M.P.P.C.F.
Alundum	50	Silica:		Slate (below 5% free SiO_2)	50
Asbestos	5	high (above 50% free SiO_2)	5	Soapstone (below 5% free SiO_2)	20
Carborundum	50	medium (5 to 50% free SiO_2)	20	Total dust (below 5% free SiO_2)	50
Dust (nuisance, no free silica)	50	low (below 5% free SiO_2)	50		
Mica (below 5% free silica)	50				
Portland cement	50				
Talc	20				

RADIATIONS

Material or Radiation	Radiant Energy	Material or Radiation	Radiant Energy
Gamma (roentgen per day)	0.1	Thoron (curies per cubic meter)	10^{-8}
Radon (curies per cubic meter)	10^{-8}	X-ray (roentgen per day)	0.1

* P.P.M.—parts per million † Mg/M$_3$—milligrams per cubic meter ‡ M.P.P.C.F.—Million particles per cubic foot of air, standard light field count.

Carbon Monoxide IN GARAGES

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Halifax, N.S.

Automobile repair garages throughout this province were surveyed for possible health hazards during the past winter and spring. Particular attention was paid to the carbon monoxide hazard. Fifty-three garages employing some five hundred men were visited during this period, and more than four hundred tests for carbon monoxide were carried out.

No attempt was made to define average conditions of exposure to carbon monoxide as conditions, particularly in the small garages, were found to be highly variable. Rather, an attempt was made in each garage to determine the maximum concentrations of CO to which workmen might be exposed during the normal course of operations.

A few of the garages were found to be equipped with local exhaust systems of good design for removing engine exhaust gases. Many others were found to have ineffective local exhaust systems, and some were relying on general ventilation fans which had, in some cases, caused serious heating problems during the winter. No ozone generators were in use in any of the garages visited, except in the office of one garage manager.

Many garage workers interviewed were of the opinion that exhaust gases had caused some impairment of their health. Most men reported that they had suffered from headaches and nausea which they attributed to carbon monoxide, and some described accidents in which they had been overcome by this gas.

A substantial percentage of the garages included in the survey are now installing suitable local exhaust ventilation systems.

Editor's Note: A pamphlet on the control of carbon monoxide in garages has been issued by the federal Industrial Health Division for distribution by provincial health departments. It has been prepared for garage operators and describes the dangers of CO and methods for its control. In particular it indicates practical design features that should be kept in mind when planning an effective ventilation system.

The suggestions given in the pamphlet are not intended to take the place of sound engineering advice where such is available. Of necessity, many points of design affecting power consumption and material economy are omitted. When the services of a qualified consultant are not procurable, however, a careful application of the suggestions given in the booklet will aid in avoiding many of the more serious errors in design and assist in planning a satisfactory system.

International INDUSTRIAL MEDICINE

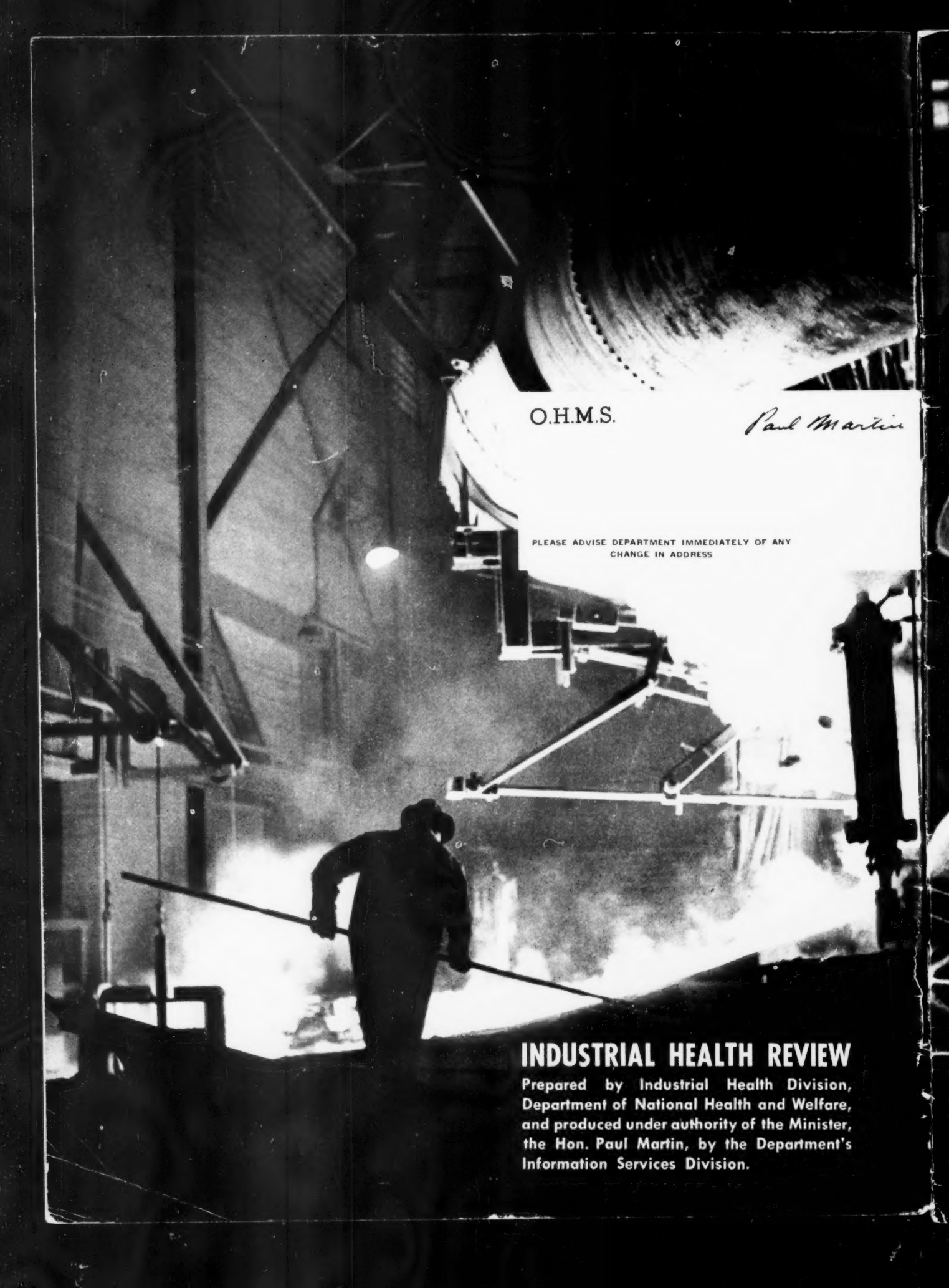
An article appearing in the September 11 issue of *The Lancet* comments on the agenda of the Ninth International Congress on Industrial Medicine held in London, England, last September. The wide range of topics considered at the Congress reflects the broadening scope of modern industrial medicine—a development which is also taking place in Canada. Since the trends revealed at this international meeting will be evaluated by all the participating countries, *The Lancet's* comments are reprinted below.

"Next week more than 700 delegates from 46 nations will attend the Ninth International Congress on Industrial Medicine at the Claxton Hall, London. It is sponsored by the Commission Internationale Permanente pour la Medecine du Travail, which was founded in 1906 as a private society of industrial physicians by Luigi Devoto of Milan; and it is a fitting tribute to Bernardino Rammazini, one of the greatest of industrial physicians, that his fellow-countrymen should have inspired this international society more than 200 years after his death. The commission now has a permanent committee in each country where industrial medicine is being practised on a large scale. The British committee are the hosts for this congress, the first to be held in Great Britain. The work of the Commission Internationale has often been wrongly associated with that of the International Labor Office, which is officially sponsored by governments, employers, and trade-union organizations. These two bodies exemplify in different ways the efforts made officially and privately to overcome the difficulties of travel and strange tongues and to break down the national frontiers of medicine.

"Since the last congress, held in Frankfurt in 1938, there has been a fundamental change in the subjects for discussion, from a limited academic approach to one which not only covers a much wider academic field but is essentially realistic. In 1938 there were three sections: occupational diseases, industrial accidents, and a combined section which dealt mainly with predisposition to industrial disease and disability. In the forthcoming congress there are six: social aspects, occupational environment, medicine and toxicology, nursing, industrial medical practice, and a special section with sessions on the medical content of law and the application of legislation. The congress of 1948 clearly means business. It will discuss the training of industrial medical officers and nurses, and the organization of industrial medical services. Methods of controlling industrial health hazards are now well established, but they need to be refined and modified so that they may be applied as widely as possible, particularly to the small workplaces which now have little or no continuous health supervision. This is a problem of organization which might well be raised in the congress discussions. All industrialized countries must face it, for the small workplace is still the backbone of world industry. Industrial accidents as a cause of disability still outweigh occupational disease in importance. High standards of safety engineering alone can never successfully control the human factors responsible for most accidents. Yet the original work by Greenwood and Woods and by Farmer and Chambers on accident proneness has had very limited applications. Industry and government must still support fundamental research and not rely too much on established methods.

"In the first place medicine served industry by helping to control disease and treating industrial injuries, and these services are still important today, particularly where the risks of accident and industrial disease undermine the health and morale of a particular group, such as coalminers on whose output European recovery largely depends. But the changed concept of industrial medicine's role is well illustrated in next week's program. It includes socio-medical and psychological problems of incentives, work and skill. Wisely the organizers have included contributions from psychologists and sociologists for health and efficiency in industry are no longer the prerogatives of doctors who have welcomed these scientists as colleagues in the battle to raise production. If medicine in industry is to survive and grow there must be radical changes in the training of students and industrial medical officers. So long as medical students are taught about the rare diseases rather than about sick human beings who have to work, their interests in occupational medicine, both as general practitioners and doctors in industry, will be confined to the treatment of industrial injuries and the investigation of industrial disease. They must be interested in the material and psychological factors which affect the health and efficiency of every working community, not only those inside factory gates and down mines. On their own doorstep the medical profession have the urgent problem of attending to the health and welfare of nurses, the shortage of whom reflects the sad neglect of attention to their working conditions in hospitals. Improved health and efficiency at work depends on the combined efforts of doctors, engineers, physicists, chemists, psychologists, and industrial nurses. Every effort should be made to integrate these disciplines as far as possible."

Edmond Cloutier, C.M.G., B.A., L.Ph.
King's Printer and Controller of Stationery, Ottawa
1949.



O.H.M.S.

Paul Martin

PLEASE ADVISE DEPARTMENT IMMEDIATELY OF ANY CHANGE IN ADDRESS

INDUSTRIAL HEALTH REVIEW

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